Opening Up the Markets for Seed Trade in Africa

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Africa Trade Practice Working Paper Series Number 2

October 2013

This work is funded by the Multi-Donor Trust Fund for Trade and Development supported by the governments of the United Kingdom, Sweden, the Netherlands and Switzerland. The views expressed in this paper reflect solely those of the authors and not necessarily the views of the funders, the World Bank Group or its Executive Directors.

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Abstract

This paper looks at the current requirements for seed trade in Africa, the obstacles these requirements impose, status of ongoing plans for regional harmonization, challenges of harmonization, and opportunities for near-term improvement. With Africa increasingly dependent on food imports, regional economic communities have been discussing harmonized seed policies for many years. While agreement on key regulations pertaining to variety release, seed certification, and phytosanitary control is now falling into place, improved farmer access to quality seeds is likely many years away due to capacity limitations and legal obstacles. Without relying on complex rules, experience elsewhere shows there are many simple options for improved seed trade that African governments could implement directly while continuing to work towards full harmonization.

Key words: Africa, seed trade, harmonization

Introduction[1]

Despite its vast agriculture potential, Africa is increasingly dependent on food imports from the rest of the world to satisfy its consumption needs. Food output has not kept pace with population growth, and more than 80 percent of production gains since 1980 have come from the expansion of cropped areas rather than from greater productivity of areas already cultivated (Rakotoarisoa et al., 2012; ADB, 2011). Africa currently spends around US$ 30 billion to US$ 50 billion on food imports annually and without an increase in per capita continental food supply, experts predict this amount will rise to US$ 150 billion by 2030 (IFPRI, 2012).

There are many reasons for Africa's failure to feed itself ranging from problems with insecure land tenure, to armed conflict, weak institutions, scant knowledge of improved farm practices, and limited access to markets for agriculture commodities and crop inputs including new varieties of seed, fertilizer, irrigation, and farm machinery (Rakotoarisoa et al., 2012; IFPR, 2012). Whereas cereal yields in other developing country regions grew at an average of 1.2 to 2.3 percent from 1980 to 2000, cereal yields in Africa increased by just 0.7 percent (FARA, 2006). This is far slower than population growth and today Africa has the dubious distinction of being the only continent that does not produce enough grain to feed itself (IFPRI, 2012).

Increasing Africa's food supply therefore requires action on many fronts including development of improved regional trade systems. Often the nearest source of inputs or demand for food staples is across a border, yet as recent World Bank studies show, problems with fragmented regional markets and lack of predictable trade policies deter much needed private investments – including

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[1] This working paper is a result of numerous consultations with seed sector and regional trade experts. Particular thanks go to Ernest Asiedu, Nic Bennett, Evan Brauteseth, Paul Brenton, Georges Dimithe, David Gisselquist, Kalipochi Kawonga, Robert Kirk, Emmanuel Mubangizi, John Mukuka, John Nash, Charles Nkhoma, Bridget O'Connor, Justin Rakotoarisona, Paul Senghor, Purity Sibanda, Mable Simwanza, Gizila Takavarasha, Michael Waithaka, and Noah Zimba for the many documents, firsthand accounts, and valuable comments provided. The views expressed in this paper are nevertheless the sole responsibility of the author as are any errors of fact or misinterpretations.

small investments by poor farmers in raising productivity to large investments in input supply, seed multiplication, and food marketing (World Bank, 2012 and 2012a). Given that different seasons and rainfall patterns are not conveniently confined within national borders, and that variability in production is expected to increase with climate change, facilitating cross-border trade of agriculture inputs and outputs is more important than ever to provide farmers and traders the opportunities and incentives they need to meet Africa's rapidly growing demand for staple commodities.

This working paper looks at the trade situation for seed. Agriculture production and marketing begin with types of seed farmers have access to and, in most African countries, it takes two to three years or more for new seed varieties to be released even if they are already being used in neighboring countries. As new seeds are introduced around the world at a faster rate, Africa falls further and further behind in the use of modern varieties making it ever more difficult to compete with food imports from the global market. Achieving sustained agriculture growth in line with Africa's own targets set by the New Partnership for Africa's Development (NEPAD) and Comprehensive Africa Agriculture Development Programme (CAADP) therefore demands new systems that provide farmers reliable and affordable access to the most up to date seed types year after year.

Thus far one of the main ways African governments have sought to address this challenge is by preparing harmonized trade rules intended to make seed trade easier, faster, and cheaper. After many years of discussion, it at last seems that agreement on most of the rules and procedures needed for harmonized trade is falling into place. None of the regional seed systems, however, are operational and before this can happen, much more remains to be done to revise national laws and build institutional capacities. Questions also remain over the risks of harmonized trade for small-scale seed producers. Would poor farmers who cannot afford improved inputs even benefit from harmonized trade, and what types of technical support and safeguards may be required for harmonized trade rules to deliver the intended benefits?

Current requirements for seed trade

Presently, all governments in sub-Saharan Africa except South Africa control the introduction of new varieties of seed for major and minor field crops through official tests to evaluate the variety's performance and to describe its characteristics (Gisselquist et al., 2013). Variety release requirements apply to all different kinds of seed intended for commercial sale (see Box 1 for a description of different seed types). Test procedures vary from country to country but normally involve a series of "value for cultivation and use" (VCU) and "distinctiveness, uniformity, and stability" (DUS) tests carried out by the national seed authority in which data needed to measure different traits are collected in various locations around the country. Developing a variety can easily take plant breeders seven to ten years or more and, with few exceptions, registration trials take a minimum of two years but often require much longer. In Ghana, for instance, all types of seed must be tested by research stations for at least one year before being put to two more years of farmer field trials while on-station tests continue (Republic of Ghana, 2010). In Kenya and Malawi, some registration tests have lasted for six and seven years respectively (Setimela et al., 2009).

Box 1: Some key definitions and facts about seed

The way a plant multiplies varies from species to species with some species reproducing through vegetative means (e.g. cassava, banana, and sugar) while others reproduce from seed as a result of open or closed pollination. Maize, for example, is a naturally open pollinated crop whereby seed (i.e. grain) is only produced when pollen from the male tassel is transferred to the female silk whereas other plant species are naturally closed- or even self- pollinating. In the case of soybeans, for instance, flowers open and remain receptive to in- sect crosspollination during the day, but if this is not accomplished, will self-pollinate at night when the flowers close. Similarly, wheat and rice can be cross-pollinated by wind, but this has a very limited success rate and self-pollination is much more common. True automatic self-pollination (cleistogamy) is most common in legumes such as groundnuts, peas, and beans.

Hybrid seed. Hybridization is a controlled method of pollination in which the germplasm of plants selected for specific characteristics is crossed by human intervention. After successive generations of controlled self-pollination by plant breeders, desirable genetic traits such as disease resistance, nitrogen use efficiency, and drought tolerance can be fixed into inbred lines. These plants have little vigor or yield potential on their own, but when crossed with one or more genetically different inbred lines, vigor is greatly restored and exceeded through a process called heterosis. These seeds are known as first generation (F1) hybrids and are noted for having uniform characteristics and high yield potential. Production of hybrid seed began with maize in the 1920s, and later extended to vegetables and flowers, and then to rice in the 1960s and 70s, and more recently to sorghum, millet, and wheat.

While F1 hybrids have many benefits, they also have certain drawbacks and may not always be the best choice for poor farmers. Most notably, saving seed from the hybrid crop to plant the next season is not recommended. Despite a popular perception that hybrid seed cannot be replanted, replanting is possible except that the two different versions of genes in a hybrid are highly unstable so segregate in the offspring thereby producing a variable progeny with 30-40% yield reduction depending on the type of cross. As a result, new seed must be bought from the seed company each year to achieve optimal F1 performance. Moreover, hybrid seeds are usually more expensive than other types of seed. Farmers in a low potential environment, and/or who cannot afford or count on local shops to stock inputs such as fertilizer needed for a high yield, might not recover the extra cost of investing in a hybrid.

Open pollinated seed. The term open pollinated variety, or OPV, typically refers to commercially bred varieties of maize, sorghum, millet, or vegetable seed that are pollinated by natural means. Certified OPV seed thus consists of many related plants selected by plant breeders for their strong characteristics. Unlike a hybrid where vigor is achieved from heterosis, vigor in an OPV by is achieved through crosspollination of naturally strong and genetically diverse parents. Certified OPV seed may thus be thought of as a kind of extended family of seed in which all members have similar related characteristics but with differences and extremes within the family. The crop of an OPV seed will not be uniform like a hybrid and the plants will vary in height, grain color, cob size, disease resistance, and time to maturity. Moreover, yield potential with most OPVs is around 25-30% lower than a hybrid under equivalent climatic conditions. On the other hand, because an OPV consists of plants with different genetic makeup, these seeds are often more robust to environmental and managerial stresses and may therefore be a better choice than hybrids for

farmers in environments with low potential and/or when supplemental nutrients are unavailable or unaffordable.

Probably the most notable advantage of OPV seeds is that they remain much truer to type from year to year and do not suffer the same yield loss as a hybrid when replanted. OPVs are therefore well suited to farmer recycling, particularly when good agronomic practices are observed. Because of being open pollinated, however, OPVs are still prone to loss of genetic purity and gradual yield reduction so should be replaced with new certified seed every three to five years. This is especially important under smallholder conditions since out-crossing with varieties from neighboring fields can easily occur.

Traditional landraces. A third category of seed common in Africa (and elsewhere) is so-called traditional seed that has a history of being passed down within a family or community for generations. Plants including maize that reproduce through natural means tend to adapt to local conditions over time and thereby evolve as reliable performers in their localities. These landraces are usually open pollinated but are different from certified OPVs that are selectively bred to conform to a particular type. Local landraces are therefore highly diverse and likely to contain small amounts of genetic material from many kinds of OPV and even hybrid seeds because of ongoing uncontrolled crosspollination. Farmers who use saved seed, including saved OPVs and landraces, do not need to purchase new seed from a seed company but do still incur a seed cost in the form of foregone consumption value. In cases when farmers do purchase a saved variety, it is usually sold (or bartered) for the same price as grain. Because local landraces are rarely registered as a formal seed type, these seeds are normally traded outside the legal system.

In Zambia, a good example of a maize landrace is ghankata. This variety is regarded by farmers as having less yield potential than certified OPVs, but is still sought after for its good taste and hard seed covering that protects from weevils during storage. Unlike most certified seed, ghankata only produces one maize cob rather than two. Farmers also say that it should not be fertilized since this would cause the plant to grow very tall and limit grain output. In a recent household survey in central Zambia, almost 30% of farmers said they plant ghankata along with other OPVs to use for home consumption and hybrid maize for cash sale.

Closed pollinated crops. Closed and/or self-pollinated crops including many legumes, rice, and wheat have the advantage of allowing farmers to recycle their seed knowing it will have the same (or very nearly the same) genetic properties as the parent as long as crosspollination is avoided or minimized. Similar to an open pollinated landrace, self-saved seeds of closed pollinated crops are much more stable compared with the seed of OPVs or hybrids thereby giving farmers less incentive to purchase new seeds each year.

The fact that closed pollinated plants easily produce reliable copies of their seed also makes hybridization technically and economically difficult. Wheat and rice hybrids have been developed that produce 30-40% more yield than traditional varieties through heterosis but because these crops are self-pollina7ng, crossing of two parents is technically challenging compared with an open pollinated species like maize. Most wheat and rice hybrids, therefore, are currently produced and used in North America and Asia where the markets are large enough to cover the costs of these advanced procedures. In Africa, not only is the total market for these seeds much smaller, but cumbersome procedures including prolonged variety release and certification requirements greatly add to total costs and undermine trade incentives.

Sources: Various including personal communica1on with seed companies and farmers; South Africa Agriculture Research Council (www.arc.agric.za/home.asp?pid=636); IRRI and CIMMYT Knowledge Bank

After the seed tests are complete, national variety release committees normally meet to review the results and make a formal decision on whether to allow the seed to be registered and sold within the country's borders or not. The criteria used by these committees vary, but typically focus on yield gain, some check variety while other factors such as stress tolerance, grain quality, taste, appearance, and processing attributes are given less attention or are overlooked completely (Gisselquist et al., 2013). In countries such as Angola, Benin, Mali, Mozambique, Nigeria, and Uganda, guidelines for appraisal of DUS and VCU data have not been published so are prone to unannounced changes and different interpretations. Variety release committees normally meet once a year but in some countries may not meet for several years due to lack of resources. In Malawi, private companies are allowed to request a meeting of the Agriculture Technology Clearing Committee at any time as long as they pay the full cost of the meeting. In Zimbabwe and Kenya there are maximum limits on the number of new varieties a seed company can register per year, and in Ethiopia, companies are only allowed to keep three registered varieties per crop per agro-ecological zone at any one time (Setimela et al., 2009).

Many countries in Africa do not currently allow companies to multiply or bulk seed until all registration procedures are complete. As a result, it usually takes two to three additional seasons after a variety has been approved to build up sufficient quantities before it can be sold to farmers (Setimela et al., 2009). Strict rules for seed certification also apply during this phase of bringing seed onto the commercial market. Although seed companies naturally do their own supervision during seed multiplication, most governments require seed plots to be visited by official seed inspectors several times throughout the growing season. When large quantities of seed are produced in a small area, the cost of these inspections is much more manageable than when production is widely dispersed across groups of small farmers. Also, the greater the number of seed crops and varieties that need to be certified, the more expensive and laborious the process becomes (Rohrbach et al., 2003). Recent research in Uganda shows how seed certification requirements have long been a competitiveness bottleneck to the point where most seed supply now comes from informal producers who operate outside the legal system and large companies are left with little incentive to bring new varieties onto the market (Joughin, 2013).

Laboratory analysis is usually also required as part of seed certification particularly when seed is traded internationally. Beyond the requirements for consignment specific import and export licensing, most African governments require internationally traded seed to be accompanied by an Orange International Seed Lot Certificate (OIC) or a Blue International Seed Sample Certificate (BIC) issued by an International Seed Testing Association (ISTA) accredited laboratory.[2] There are currently seven laboratories in Africa (out of 116 worldwide) accredited by the ISTA to do seed sampling and issue OIC and BIC Seed Certificates including one each in Egypt, Kenya, Malawi, South Africa, Uganda, Zambia, and Zimbabwe. Nevertheless, even with an ISTA Certificate, seed

[2] Both certificates can only be issued by an ISTA accredited laboratory. OICs are issued when both sampling from the seed lot and testing of the sample are carried out under the responsibility of an ISTA accredited lab; BICs are issued when sampling from the seed lot is not under the responsibility of an ISTA accredited laboratory and the accredited facility is only responsible for testing the sample as submitted. See: www.seedtest.org

consignments are very often put to further analysis by the importing country's own seed authority and/or other standards body to check once again for germination, physical purity, and other quality attributes. Invariably, the cost of these inspections is charged to the commercial partners in the trade deal so ultimately result in higher prices for end users.

Finally, as with all other internationally traded plant products, seeds are subject to phytosanitary control to prevent the spread of pests and disease. Under the terms of the International Plant Protection Convention (IPPC), exporters of plant products are required to obtain a phytosanitary certificate from their National Plant Protection Office (NPPO) to verify that the product meets the importing country's phytosanitary import requirements.[3] Various tests and inspection visits by plant health officers (who are different from seed inspectors) are usually required before a phytosanitary certificate can be issued. On top of these procedures, various other tests and inspections are often carried out and charged for by the importing country to re-check that all phytosanitary conditions have been met. In addition to routine border inspections, for example, seed exporters are often required to send pre-shipment samples to the importing country two to three weeks before the expected arrival date so that various types of analysis can be carried out.

Implications of Africa's seed trade requirements

While each country's regulations for variety release, seed certification, and phytosanitary control aim to serve perfectly legitimate and desirable functions, problems soon arise when different countries with small seed markets each impose their own standards that delay the introduction of new varieties and/or when certification and testing requirements become more about raising revenue for the certifying body than actual protection of consumer interests or plant health. In Malawi, a private company recently reported paying over US$ 13,000 to cover one season of variety release trials for one type of soybean seed only with almost 85 percent of the cost going to cover out of station allowances and travel expenses for seed inspectors, assistant seed inspectors, and drivers against just 15 percent for materials and data analysis. Similarly, seed companies in Ghana pay a minimum of US$ 3,500 per year for the expression of interest and seed entry, plus the full cost of site supervision and all materials used in on-station and farmer field trials even when other test data are available or if the variety has been approved elsewhere with similar growing conditions (Keyser, 2013). Many African countries require VCU tests at three to six sites and, in Benin, VCU trials must be carried out at 25 separate sites (Setimela et al., 2009).

As a result of such requirements, many seed companies say they only bother to register a few varieties in each country that are generally suited for each market even though other seeds in their portfolio may be even better adapted to certain locations and/or offer better value for some end users. The cost and time taken for seed registration, therefore, is not only of direct financial importance to the seed companies, but can also have a major impact on agriculture production and the time farmers must wait to access to new and improved technologies.

[3] In Africa, all countries except Angola, The Democratic Republic of Congo, Gambia, Lesotho, and Somalia are contracted to the IPPC. See: www.ippc.int

Striking the right balance between genuine regulatory concerns and support for private innovation, in fact, has long been a vexing challenge for policymakers in Africa and other transition economies. Whereas regulators in most industrial market economies allow private firms to introduce new technologies without government preview or approval, as long as there are no major problems or externalities, regulators in Africa are often motivated by mistrust of private companies and so tend to adopt policies that suppress market entry and competition (Gisselquist et al., 2002).

One common argument in favor of strong seed regulations in Africa, for example, is that governments have a fundamental responsibility to ensure that all inputs sold to farmers are appropriate to local conditions and meet certain minimum standards for germination and yield performance. Concerns for the limited seed testing and certifying capacity of neighboring countries are likewise often cited as justification for each country having to carry out its own seed trials and certification tests (Gisselquist et al., 2002; Rohrbach et al., 2003; Setimela et al., 2009). While there are indeed serious risks of allowing defective seeds onto the market, it can equally be argued that formal companies who trade on their reputation already have the strongest incentive of all to ensure that the products they sell are good performers and appropriate to their customers' needs. By comparison, problems with informal traders selling counterfeit certified seed are common in Africa, yet government regulators give far less attention to addressing this problem through routine market surveillance than to variety registration and certification of commercial seed stocks (Keyser, 2012; World Bank, 2012b; Joughin, 2013).

Regulations that discourage private sector competition also risk imposing a heavy burden on public sector agriculture research systems. Whereas private firms by definition invest in new technologies to earn the highest possible financial return, governments are concerned with a much wider set of social objectives including domestic food security, environmental protection, and outreach to farmers in remote areas who may be of little interest to private suppliers. To the extent that seed regulations and trade rules discourage private sector participation and/or forestall the introduction of commercially bred varieties, public researchers can end up having to work in areas where private firms would enjoy a competitive advantage at the expense of fulfilling other social objectives.

Rigid variety release requirements and seed certification standards also give rise to a number of risks and barriers to the trade of local landraces in domestic and cross-border markets. Traditional landraces are almost never put to formal DUS and VCU tests like hybrid seeds and OPVs. As a result, these seeds are rarely allowed for international trade and, technically, may not even be allowed for domestic trade or use on a farmer's field even though everyone knows this takes place. In Ghana, Zambia, and other countries, current seed laws specifically state that only registered varieties may be bought and sold (Republic of Ghana, 2010; Republic of Zambia, 1997). In principle, the rights of farmers to exchange recycled seeds are protected by the Food and Agriculture Organization's (FAO's) International Treaty on Plant Genetic Resources for Food and Agriculture (IT-PGRFA), yet existing seed laws in many countries contradict the Treaty and/or do not provide for the rights of farmers to save and sell local varieties as they always have.

Taken together it is clear that current seed regulations not only militate against regional seed trade but also impact negatively on seed price, seed availability, and new variety development to the

point where many have warned that Africa is unlikely to meet its NEPAD and CAADP targets (FARA, 2006; Rakotoarisoa et al., 2012; Gisselquist et al., 2013). Considering only crops for which data are available from at least five sub-Saharan countries a median of just 0.62 new varieties were released across eight major food crops per country per year between 1998 and 2010 ranging from 0.19 new varieties of pearl millet to 0.85 new varieties for beans. Maize in eastern and southern Africa is an exception with an average of 11 new varieties being released per year by Kenya, Tanzania, and Zambia from 2000 to 2008 including an average of 7.7 new varieties by private companies and 3.3 varieties from public institutions. In 11 western and central African countries, on the other hand, just 0.75 new varieties of maize were released per country per year from 1965 to 2006 with only 0.24 new varieties coming from the private sector per year, against 0.51 new varieties per country per year from public institutions (Gisselquist et al., 2013).

To put the implications of Africa's seed regulations into perspective, it is useful to compare the continent's performance in variety release with that of South Africa. Unlike other sub-Saharan countries, South Africa does not require any VCU performance tests to release a new variety and only asks for one season of official DUS tests to describe the seed's characteristics thereby making registration an automatic formality (Setimela et al., 2009; Gisselquist et al., 2013). Between 2000 and 2010 farmers in South Africa thereby gained access to a median of 45 new varieties of maize per year, 10 new varieties of beans per year, and six to eight new varieties per year each of potatoes, sorghum, sunflower, and wheat. As in other African countries, South African public research organizations provided less than one new variety per year for major food crops, but unlike other countries where private firms have done little with crops apart from maize, private firms in South Africa accounted for almost 90 percent of new varieties of beans, groundnuts, potatoes, sorghum, sunflower, and wheat released since 2000 (Gisselquist et al., 2013).

Table 1 looks at the total recorded value of maize seed exports for sub-Saharan Africa, for different regions of sub-Saharan Africa, and the world as a whole. Maize seed is by far the most commonly traded seed crop in Africa and these data show the continent only accounted for around 4 percent of total world exports over the period covered. Of Africa's exports, more than 76 percent came from southern Africa, 21 percent from eastern Africa, and 2 percent from western Africa.

Table 1: Total Value of Maize Seed Exports by Sub-Saharan Africa and the World, 2007-2012

	2007	2008	2009	2010	2011	2012
Total exports (US$ millions)						
World	**1,275.4**	**2,126.7**	**1,974.8**	**1,930.7**	**2,440.5**	**2,558.8**
Sub-Saharan Africa	**16.7**	**88.9**	**85.2**	**103.0**	**154.5**	**68.5**
Eastern Africa	-	10.0	15.6	22.7	15.8	30.3
Southern Africa	16.7	78.9	69.2	68.4	138.6	37.7
Western Africa	0.0	0.0	0.5	11.9	0.2	0.5
Africa's exports as percent of world total						
Sub-Saharan Africa	**1.3%**	**4.2%**	**4.3%**	**5.3%**	**6.3%**	**2.7%**
Eastern Africa	0.0%	0.5%	0.8%	1.2%	0.6%	1.2%
Southern Africa	1.3%	3.7%	3.5%	3.5%	5.7%	1.5%
Western Africa	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%

COMTRADE database (accessed August 9, 2013)

On the import side, sub-Saharan Africa accounted for an even smaller share of total world trade at just 2.5 percent of global imports of maize seed from 2007 to 2012 thereby indicating the continent's heavy dependence on domestic seed producers and Africa's limited exposure to international technology (COMTRADE, 2013). To put these trade figures in context, Africa accounts for around 20 percent of the world's total maize area (FAOStat, 2013).

Next, Table 2 takes a closer look at the source of Africa's maize seed exports. As shown, South Africa, Zambia, Uganda, Malawi, Kenya, Tanzania, and Zimbabwe were the most important maize seed exporters in that order and together accounted for almost 97 percent of sub-Saharan Africa's total exports from 2008 to 2011. According to these data, around half of sub-Saharan Africa's total maize seed exports originated in South Africa. In terms of market destination, however, further analysis of the COMTRADE data reveal that only around 40 percent of South Africa's maize seed exports went to buyers in other African countries whereas virtually all of the exports from each of the other countries were sold intra-regionally to buyers in Africa. In these terms, therefore, Zambia ranks as Africa's largest exporter of maize seed to other African countries and accounted for more than 41 percent of Africa's intra-regional seed trade over the period covered.

Table 2: Total Value of Maize Seed Exports by Top-7 Sub-Saharan Africa Exporters, 2008-2011 (US$ millions)

	2008	2009	2010	2011	Total	% total
Top-7 African Maize Seed Exporters						
South Africa	61.2	44.4	39.5	64.9	**210.0**	50.3%
Zambia	16.4	21.3	28.1	55.1	**120.9**	29.0%
Uganda	5.4	10.0	16.3	13.9	**45.6**	10.9%
Malawi	1.1	2.7	0.4	16.9	**21.2**	5.1%
Kenya	3.3	4.3	6.0	n.d.	**13.7**	3.3%
Tanzania	1.3	1.2	0.0	1.5	**4.0**	1.0%
Zimbabwe	0.0	0.3	0.3	1.3	**2.0**	0.5%
Total top-7 exporters	**88.7**	**84.4**	**90.8**	**153.6**	**417.4**	**100.0%**
Sub-Saharan Africa	88.9	85.2	103.0	154.5	**431.8**	-
Top-7 as % SSA	99.7%	99.0%	88.1%	99.4%	**96.7%**	-

"n.d." indicates no data.
COMTRADE database (accessed August 9, 2013).

Efforts to harmonize seed trade policies in Africa

To improve the trade situation for seed, various regional economic communities (RECs) and other groups of countries in Africa have been discussing ways to harmonize trade procedures for many years. With donor support, harmonized regulations modeled on the seed schemes of the Organization for Economic Cooperation and Development (OECD) and European Union (EU) have been developed by the Economic Community of West African States (ECOWAS), West African Economic and Monetary Union (UEMOA), the Southern Africa Development Community (SADC), the Common Market for East and Southern Africa (COMESA), and the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA). Chad and Mauritania have further endorsed the ECOWAS approach and are participating through the

Permanent Interstate Committee for Drought Control in the Sahel (CILSS).[4] Appendix 1 gives a list of countries in each regional group and Appendix 2 shows the crops covered by each regional agreement.

The proposed rules differ from REC to REC but each system seeks to establish common procedures for variety testing and release and seed certification based on internationally recognized standards set by the International Union for Protection of New Plant Varieties (UPOV) and ISTA respectively.[5] COMESA and SADC further attempt to streamline the procedures for phytosanitary control by establishing common pest lists for seed inspections. In West Africa, ECOWAS and UEMOA have agreed to adopt identical regulations and implementing procedures with ECOWAS taking the lead. None of the regional agreements would override national laws on genetically modified seed.

In each region, the main objective of adopting harmonized seed rules is to improve farmer access to quality seed at affordable prices. Africa's commercial seed markets are small by global standards and most seed trade occurs across a narrow range of crops. By harmonizing trade procedures, African governments expect to avoid a substantial amount of repetitive national testing thereby making seed trade easier, faster, and cheaper. This is hoped will transform the market and create new incentives for local and international seed companies to introduce new varieties and provide African farmers the quantity, quality, and choice of seed needed to support broad based agriculture growth and expansion (Rohrbach, 2003; SADC, 2008; Mukuka, 2011; Waithaka et al., 2012; Gisselquist et al., 2013).

Despite years of work by technical specialists, stakeholder consultations, and high-level ministerial meetings, none of the regional agreements are fully operational. Again, the exact circumstances vary from REC to REC, but each is still in the process of developing, discussing, and approving the required implementation regulations, protocols, and/or domestic laws needed to make harmonized seed trade a reality.

Variety release. A key feature of the ECOWAS, SADC, and COMESA harmonized seed systems would be the establishment of regional seed catalogs whereby any variety entered in the region's catalog would be allowed for trade and multiplication throughout the region without further registration requirements. Under the ECOWAS regulations, a new variety would only need to be registered in one member country to be eligible for entry in the regional catalog, whereas in SADC and COMESA a variety would have be registered in two member countries before it could be entered in the region's seed catalog. In ASARECA countries, a slightly different approach would

[4]A catalogue of national varieties registered by individual members of the Economic Community of Central African States (CEMAC) was recently published by the FAO together with the Regional Centre of Applied Research for the Development of Farming Systems in Central Africa (PRASAC) (FAO, 2012). Beyond this initial step, however, CEMAC countries have not yet taken concrete action to harmonize their seed regulations.

[5] Except where indicated, the description of the seed systems that follows is drawn from COMESA, 2013; ECOWAS, 2008, 2013, and 2013a; SADC, 2008; Waithaka et al., 2012; and personal communication with the coordinators of each regional program.

apply whereby any variety registered in another country's national variety catalog would only require one year of domestic testing in a new country before it is registered provided sufficient test data are available from previous seed trials in similar agro-ecological zones.

In all regions, release trials would be carried out in accordance with UPOV guidelines for DUS and VCU testing. Kenya, Tanzania, and Uganda are currently implementing the ASARECA approach but no other multi-country list of approved varieties is yet in operation. Unlike the other RECs, SADC is careful to emphasize that the harmonized rules are not intended to replace or override national seed laws and that seed may still be traded under existing systems if countries desire.

Seed certification. With respect to seed certification, each region would further create a harmonized labeling system for different generations of seed (pre-basic seed, basic seed, certified seed, etc.) based on ISTA standards for variables that include minimum isolation distance, maximum percent of off-types, minimum number of inspections, minimum germination percent, minimum pure-seed by weight, and maximum percent moisture. Seed inspectors would be required to visit seed plots three to five times during the growing season depending on the crop and type of seed being produced. Seed lots proposed for certification would then require laboratory analysis in accordance with ISTA rules to verify that the seed conforms to the agreed specifications. Seed crops that pass the field and laboratory inspections would then be labeled according to the system and become eligible to receive a mutually recognized regional seed certificate designed to avoid the need for retesting by the importing country upon paying the requisite fees.

Phytosanitary control. With respect to phytosanitary measures to limit the spread of plant pests and disease, both SADC and COMESA have prepared universal pest lists for each seed crop in the system. Whereas COMESA has only prepared one set of draft lists for all types of seed trade, SADC has prepared two sets of lists including one for pests that require control when seed is traded between member states and another for when seed is traded into SADC from outside the region. Both approaches are intended to mean that phytosanitary testing and quarantine measures are only required for pests and diseases that are not common in all member states. Moreover, since participating countries would be testing for the same things, retesting of seed consignments on arrival in the importing country could be reduced and, in principle, eliminated. In ASARECA and ECOWAS, countries are similarly encouraged to review their pest lists for seed as a step toward the development of regional quarantine pest lists. In all regions, phytosanitary certificates will continue to be issued by each country's NPPO in accordance with established terms of the IPPC.

Implementation status. While considerable progress has been made in developing rules and implementation guidelines, none of the regional systems are currently operational. The best that has been achieved in the core area of variety release is that Kenya, Tanzania, and Uganda through ASARECA only require one season of domestic seed trials if the variety has been released in one of the other two countries. Also through ASARECA, six countries (Burundi, Ethiopia, Madagascar, Sudan, Tanzania, and Uganda) have developed shared seed certification standards for at least ten crops, but in practice, none of these so far recognizes other countries' seed certification tests (Waithaka et al., 2009).

In West Africa, the Council of Ministers for UEMOA and ECOWAS adopted identical regulations for regional seed trade in March and May 2008 respectively (IFDC, 2009). Since then, Member Countries together with Mauritania and Chad have been working through ECOWAS to develop the detailed implementing regulations and other modalities needed to bring the 2008 Regulations into effect. Implementing Regulations related to the establishment of a Regional Seed Committee have since been adopted while other regulations relating to the organization of the regional seed catalog and seed certification and quality control requirements are still under review (ECOWAS 2013 and 2013a). The West and Central African Council for Agriculture Research and Development (CORAF) in Dakar was recently appointed to coordinate the technical deliberations and support implementation for the next five years. With CORAF support, experts say they expect the Regional Seed Committee to be operational by the end of 2014 and that remaining legal instruments needed to implement the system could be approved in early 2015. Once approved, the ECOWAS Regulations will, in principle, be binding and supersede national seed laws except that changes in national regulations and/or laws pertaining to variety catalogs, seed committees, and seed funds will still be required to support implementation of the regional system.

In southern Africa, discussion of harmonized seed policies began in 1987 when the idea was first floated as part of a review of seed system development strategies under the former Southern Africa Development Coordination Conference (SADCC) (Rohrbach et al., 2003). From this early beginning, discussion of harmonized seed polices continued on and off throughout the 1990s until, in 2001, the Swiss Agency for Development and Cooperation (SDC) agreed to support establishment of the SADC Seed Security Network (SSSN). With Swiss and other donor support including assistance from the United States Agency for International Development (USAID) through the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Sustainable Commercialization of Seeds in Africa (SCOSA), and Iowa State University, the International Center for Improvement of Maize and Wheat (CIMMYT), and the FAO, SADC eventually launched a comprehensive set of Regional Seed Rules in 2008 (SADC, 2008). In February 2010, five Ministers of Agriculture signed a Memorandum of Understanding (MOU) to implement the SADC Seed Rules and, in 2011, the SADC Seed Centre at Chalimbana near Lusaka was appointed to serve as secretariat.

Per the terms of the SADC Treaty, however, actual implementation of the seed system could not begin until at least two-thirds of SADC Member Countries signed the MOU. This target was finally reached in June 2013 with all but five SADC Member Countries now having signed as parties to the MOU.[6] Still, before harmonized seed trade can become reality, each participating country must align its national seed laws to conform to the regional system through a process known as domestication. According to the SADC Seed Centre, this means the full system might only be running by 2015 or 2016 provided new national laws are put in place. Malawi is currently reviewing its seed laws to bring the text into compliance with the regional system, whereas Zambia has made

[6]As of August 2013, countries that have not yet agreed to implement the SADC seed rules are Angola, Madagascar, Mauritius, Seychelles, and Zimbabwe. According to the SADC Seed Centre, Angola and Mauritius plan to sign soon.

the revisions already but still requires Parliamentary approval. In both cases, therefore, it is likely to be some time before the new laws actually take effect.

COMESA began its discussions of harmonized seed rules much more recently than other RECs and so had the advantage of being able to model its draft regulations on those already put forward by the other regions. In March 2008, COMESA Ministers of Agriculture, Natural Resources, and/or the Environment declared their intent to "rationalize and harmonize" seed policies and regulations across 19 Member States and directed the Alliance for Commodity Trade in Eastern and Southern Africa (ACTESA), a specialized agency of COMESA, to lead the process (Mukuka, 2011). With financial support from the European Union, ACTESA carried out a series of consultations with public and private sector stakeholders throughout the region and, in 2010 with support from USAID, partnered with the African Seed Trade Association (AFSTA) and Iowa State University that together helped develop the technical regulations (COMESA, 2013). The Draft COMESA Regulations have since been reviewed and cleared by a legal committee and by Ministers of Agriculture, Natural Resources, and/or the Environment with a view to seeking final approval from the COMESA Council of Ministers by the end of 2013.

As in ECOWAS, a decision by the COMESA Council of Ministers to implement the seed system will be binding on all Member Countries. This, however, does not mean that harmonized seed trade will begin automatically since national seed laws in each Member Country will still need to be brought into conformity with the regional directive before that member can participate. Various technical capacities will also have to be developed including accreditation of seed laboratories to ISTA standards as well as licensing and registration of seed inspectors, seed samplers, and seed analysts (ACTESA, 2013). In anticipation of a decision by the Council of Minister's to proceed with harmonization, ACTESA proposes to launch the new Capacity Improvement of the Seed Sector in the COMESA Region Program (CISSCO) to support the system's start-up and domestication of regional seed regulations.

Risks and alternatives to harmonization

Adoption of harmonized trade rules is a well-established and popular approach to trade facilitation that has helped many countries around the world save on trade costs and improve their competitiveness position. The European Union and OECD already operate well-established harmonized systems for seed trade (see Box 2). Harmonization with international norms, however, is not the only option for improving seed trade and can even create new bottlenecks if the harmonized standards are set too high for users to afford or if the requirements are too difficult for countries to implement. Picking the right approach to trade facilitation is therefore an important part of improving famer access to quality inputs and Africa's agriculture competitiveness more generally.

Box 2: Harmonized seed trade in developed countries

In the European Union, seed trade and marketing is regulated by harmonized directives for variety registration and seed certification that are implemented by all 27 EU Member States. Under the EU Seed System, all varieties of agriculture and vegetable seed must be registered in the EU Common Catalogue before they can be sold or traded. To be registered, a variety only needs to be tested and approved by one EU government. All other EU members will then accept the variety without further registration tests or release decisions. As part of these arrangements, all technical examinations are conducted according to specific fixed rules for field inspections, seed sampling, and laboratory analysis performed by national seed officials or authorized private operators working under official supervision. To import seed into the EU, national provisions in the exporting country are checked to ensure they provide equivalent assurances of seed quality.

The OECD similarly offers a number of schemes that enable seed certification for a range of different crops intended for international movement. Like the African systems, a key element of OECD seed certification is that the crop is inspected in the field according to internationally recognized procedures and then tested to ensure it conforms to the required standards of variety, identity, and purity. When the certification process is complete, OECD labels are fixed to the seed sacks. The OECD schemes are widely used for international seed trade but are only available in countries that have had their national seed certification procedures validated by OECD. Worldwide, 58 countries participate in OECD seed schemes including all EU Member States. In sub-Saharan Africa, only four countries currently participate in OECD seed schemes including Kenya, South Africa, Uganda, and Zimbabwe.

Sources: OECD, 2012; FAO, 2006.

In practice, some African countries have been discussing harmonized rules for seed trade for more than two decades and all are still several years off from making harmonized seed trade a reality. One of the first and most obvious costs of harmonization, therefore, is that countries that are more willing to open up their markets to private variety introduction end up being held back by the least progressive trade partner. Harmonization in accordance with ISTA rules and other top-level international standards also creates pressure for countries to upgrade their seed inspection and laboratory capabilities when other more cost-effective approaches to quality assurance may be available.

In the United States, for example, seed certification and registration trials are not mandatory. There are no lists of approved varieties or required registration or certification tests. Instead, government requires seed companies to describe their varieties on seed packs so that it may enforce truth in labeling (Gisselquist et al., 2013). To improve the competitiveness and marketability of their product, U.S. seed companies still have the option to certify their seed as part of an OECD seed scheme or other seed scheme, but this is not mandatory or even undertaken by the U.S. Government itself. When seed is certified in the United States, it is therefore done by some independent agency such as the Association of Official Seed Certifying Agencies (AOSCA). Other than the United States, AOSCA has certifying agencies located in North and South America, Australia, New Zealand, and South Africa (OECD, 2012).

Another cost effective and expedient alternative for variety release is for governments to keep lists of registered varieties for major field crops but to make actual registration an automatic formality. South Africa and Bangladesh (for all but five crops) have adopted this approach. South Africa asks for one season of official DUS tests to describe the variety's characteristics but does not require VCU tests and otherwise allows companies to introduce new varieties as they wish. In Bangladesh, on the other hand, government automatically accepts new varieties on the basis of DUS data provided by the company. Similar to the U.S. approach, the rationale for not requiring performance tests is that market forces should determine the best varieties. If a farmer buys a variety that performs poorly, the company loses that customer forever. In Africa, Kenya, Uganda, and Nigeria have made variety registration automatic for vegetable seed while Uganda has also done so for pasture seed (Gisselquist et al., 2013).

A further option for speeding the adoption of new varieties is to accept varieties registered in other specific countries without domestic seed trials. This is similar to the EU's harmonized approach and type of action being planned in Africa, except that a country can always adopt new varieties unilaterally without waiting for regional partners to harmonize seed rules and build capacity. Romania, for example, implemented this reform in the late 1990s by accepting all varieties registered in the European Union's Common Catalogue even though it was not a member of the EU at the time (Gisselquist et al., 2013).

There is, in fact, a great deal of compelling evidence from around the world to suggest that unilateral steps to ease the requirements for variety registration can have a profound impact on agriculture productivity and rural income. Turkey, for instance, relaxed controls on variety registration in 1982 by deciding to accept DUS and VCU data supplied by private seed companies. Within five years, the cumulative number of maize hybrids available to farmers increased from 24 to 114 and, by 1992, average per hectare maize yields were 1.4 tons above pre-reform trends adding an estimated US$ 97 million per year to agriculture value added. The number of non-hybrid varieties of soybeans, wheat, and potatoes also increased significantly leading to similar dramatic increases in crop yields and farmer profits (Gisselquist and Pray, 1999). Likewise, in Pakistan, the introduction of private maize hybrids helped raise average yields from an average of less than two tons per hectare before reform to more than three tons per hectare from 2005 (Pray et al., 2012). In Bangladesh, the impact of seed reforms were even more dramatic with private hybrids helping to raise average maize yields from less than one ton per hectare before 1991 to more than six tons per hectare from 2010 thereby adding an estimated $125 million per year to farmer incomes (Harun-Ar-Rashid et al., 2012).

Finally, with respect to seed certification, one practical alternative to the comprehensive set of ISTA rules is the FAO's Quality Declared Seed (QDS) System. The QDS approach is suited to a wide variety of crops and provides a less-demanding alternative for seed quality assurance by only requiring field inspection and laboratory analysis of 10 percent of seed plots and QDS seed offered for sale respectively. According to FAO, the QDS System has been particularly valuable in supplying good quality seed to relief and emergency situations and is also well suited to commercial situations where suppliers including local cooperatives, farmer groups, non-governmental

organizations (NGOs), and even large private farms would find the requirements of full quality control difficult or cost prohibitive (FAO, 2006).

In southern Africa, the SADC seed system provides for the labeling and trade of QDS seed as long as the variety has been registered in accordance with regional DUS and VCU test requirements. ECOWAS and COMESA, on the other hand, do not provide any alternative for seed certification to the full set of ISTA procedures. As noted, capacity limitations for seed certification have long been an important problem in Africa. By formalizing elaborate field inspection and laboratory test requirements without offering any practical alternative for quality control, therefore, the ECOWAS and COMESA systems (in their current form) not only stand to make seed exports difficult for countries that lack the required capacity, but could in fact perpetuate problems that gave rise to calls for harmonization in the first place. Even Uganda, which does have an ISTA accredited lab and is therefore well ahead of many other African countries, still does not have the capacity to carry out all of the required inspections to meet its own demand for seed let alone the demand from Kenya and other potential export markets (Joughin, 2013). Africa has little use of regulations that cannot be implemented and by deciding to adopt high-level international standards for seed certification the COMESA and ECOWAS regulations risk making seed trade even more difficult than it is now.

Ongoing challenges for African seed policy

By choosing to harmonize seed policies on a regional basis, African leaders in fact opted for one of the most technically demanding approaches to trade facilitation. Unilateral moves to relax variety registration requirements (as in South Africa, Bangladesh, or Turkey) or to accept another country's variety list (as Romania did) would have been, and could still be, a much easier and more expedient way to improve a farmer's access to new types of seed for individual countries. While it seems the necessary regional instruments and operating guidelines needed for harmonized seed trade are at last falling into place, this has required many years of dialogue on matters ranging from which crops to cover, to what standards to enforce, how seed traders and seed producers will be registered and supervised, what pests to include on universal pest lists, and other equally complex and controversial issues. African policymakers deserve credit for navigating these issues and getting as far as they have, but must also not be under any illusions that actual harmonized seed trade is about to take off or be problem free.

In practice, successful policy reform depends on much more than writing official documents and getting official comments and also requires a long-term commitment to building new institutional capacities together with an ongoing dialogue with a broad range of stakeholders to build support for the new systems and avoid unexpected negative outcomes. This is particularly true given Africa's decision to harmonize the rules for regional seed trade in line with high-level international standards. Whereas there are indeed many costs to allowing bad seed onto the market, there are also very high costs to adopting systems that are difficult or expensive to implement. For example, while some countries in SADC and COMESA do already have ISTA accredited laboratories, no country in ECOWAS has reached this level potentially meaning that no national registration tests or certification procedures would be eligible for mutual recognition under West Africa's own seed

system. A number of important concerns have also been voiced by civil society organizations (CSOs) for the risks to Africa's biodiversity and rights of farmers to buy and sell recycled seeds. At present, only the SADC seed system includes provisions for the registration and trade of local landraces even though these seeds are critically important to agriculture and food security in the ASARECA, COMESA, and ECOWAS regions as well.

Despite these and other challenges to successful reform, harmonization of Africa's trade rules for seed offers many important benefits. Plans to establish regional seed catalogs on the basis of trials done in other countries will avoid the expensive and time-consuming problem of having to test and register each new variety in every country thereby greatly increasing the size and value of the African market and making the continent a much more attractive place to do business for local and international seed companies alike. Likewise, if African governments are truly willing to recognize seed certification marks and phytosanitary inspections of exporting countries, this will greatly reduce the costs of doing business to the benefit of farmers and agriculture productivity more generally.

With these issues and trade-offs between harmonization and other possible approaches to trade facilitation in mind, it is useful to review some of the key areas where Africa's harmonized seed systems are likely to face particular implementation challenges. Although other approaches may have been more expedient, Africa has put a great deal of time and effort into harmonization and the potential benefits are indeed significant if the systems can work.

Capacity limitations may prevent broad participation. Probably the most notable challenge created by the plans for harmonized seed rules is the requirement for exporting countries to comply with ISTA seed certification standards. The SADC system allows for international trade of varieties inspected to lower-grade QDS standards, but the other regional seed agreements do not. This means that all seed traded under the ASARECA, COMESA, and ECOWAS systems will require three to five official field inspections per crop together with laboratory analysis according to ISTA rules. Already seed certification capacity in many countries is overstretched and the harmonized rules could easily preclude small seed producers from participating in the regional market if they are widely dispersed and/or do not produce enough seed to cover the fixed cost of each field visit.

To avoid unnecessary bottlenecks and help create a place for small seed producers in the regional market, ASARECA, COMESA, and ECOWAS may therefore do well to include QDS seed as part of their regional approach. With QDS, only 10 percent of seed plots have to be inspected and spot visits could be funded by comparatively modest application fees paid by registered QDS producers. Encouraging private seed inspectors and private laboratories to take responsibility for some or all parts of seed certification, as in the EU, would be another good option to explore. Without systems that make comprehensive inspection of seed lots easier (or at least possible), many countries will continue to be dependent on informal seed producers thereby giving rise to problems of counterfeit seed traded in open markets that are difficult to control.

As the regional systems stand now, many administrative requirements and bottlenecks are likely to arise with regard to the training and licensing of seed inspectors, seed samplers, and seed analysis under each system. For its part, SADC envisions that all seed technicians will have to pass a prescribed technology course followed by at least one season of practical training under the mentorship of an already authorized seed specialist (SADC, 2008). Training curriculum and evaluation criteria will therefore have to be standardized implying a need for new technical working groups and/or donor funded implementation support projects that could further delay implementation. Capacity building may well be necessary for long-term growth and development, but should not become an institutional requirement for farmer access to improved inputs.

In ECOWAS, the current regulations likewise envision "professional cards" being issued every three years against set admission requirements to all seed/plant breeders, seed producers, wholesalers, retailers, importers/exporters, and associated professionals including packaging professionals, brokers, and even transporters participating in harmonized seed trade (ECOWAS, 2008).

Harmonized rules do not currently protect the trade of local landraces. Further issues arise for the need to protect the trade of local landraces and other saved or recycled seed types. Strong concerns have been voiced by farmers' rights groups and other CSOs alleging that the harmonized trade agreements could make it illegal for farmers to conserve local seed types thereby threatening Africa's biodiversity and potentially making the continent dependent on international seed companies (Africa Centre for Biodiversity, 2012 and 2013; ZCCN, 2013). Given that many national seed laws such as the ones in Zambia and Ghana do not currently provide a legal space for farmers to sell, barter, or exchange saved seeds, and that the regional agreements only address international trade and not domestic trade, these objections are perhaps exaggerated and/or have little to do with the regional seed systems themselves.

Nevertheless, only the SADC seed system currently provides for the registration of landraces based on farmer experiences while the other regional systems do not. As such, the ASARECA, COMESA, and ECOWAS proposals in their current form would perpetuate institutional barriers to the legal cross-border trade of locally adapted seed types between farmers in neighboring areas. Trade of these seeds might still be allowed under other rules, but by overlooking the importance of traditional landraces, these RECs are at least missing an important opportunity to create legal space for international trade. Traditional landraces are unlikely to provide the kind of boost to food production that Africa needs to be competitive with global imports, but are of great importance to food security for millions of subsistence and semi-commercial farmers and deserve to be recognized.

Careful consideration should therefore be given to including appropriate safeguards to protect rights of farmers to trade registered and even unregistered landraces as part of each system. In India, for instance, the Plant and Variety Protection and Farmer's Rights Act of 2001 allows famers to sell seed of protected varieties from their harvest in domestic markets as long as they do not use the registered brand name.[7] Such a principle might be adapted for intra-regional trade in Africa.

[7] See: http://www.dandc.eu/en/article/indias-law-plant-variety-protection-and-farmers-rights.

Although this raises important questions for the intellectual property rights of seed breeders, and might deter the introduction of new varieties of OPV and closed pollinated seeds, F1 hybrids by and large would not be affected since these seeds do not produce reliable copies in the offspring and naturally need to be replaced each year. At the very least, the regional agreements would do well to reiterate the rights of farmers to save and recycle seed and to share the benefits arising from the utilization of plant genetic resources for food and agriculture as established by the IT-PGRFA.[8]

Many legal hurdles remain to enacting harmonized seed trade. It is also apparent that a great many legal obstacles remain to getting each regional system off the ground. Where they exist, most national seed laws in Africa were created before economic liberalization and so are still set in the context of variety development led by public institutions rather than private competitive companies. Even where seed acts have been modernized, however, they are broadly inconsistent with the regional approach. The newly revised Ghana Plants and Fertilizer Act of 2010, for example, specifically requires three years of domestic field tests for a variety to be released thereby contradicting the ECOWAS Regulations of 2008 that call for the establishment of a regional seed catalog based on mutual recognition of test results. Once approved, the full set of ECOWAS Implementing Regulations will supersede domestic seed laws in principle, but in practice will still require national legislation to be amended (or created) in each country to support full implementation.

Similarly, in COMESA, the regional regulations will be binding on Member States once approved, but in practice, national seed laws must be aligned with the regional approach before harmonized trade can begin. In ASARECA and SADC, countries are not specifically obliged to follow the regional regulations, but participating countries must nevertheless domesticate the regional approach into their national laws before they can take part in the system. Looking to the future, there are also looming issues for the mutual recognition of variety lists and other seed procedures between RECs and of harmonization between SADC and COMESA as these communities move towards the creation of a tri-partite free trade area together with the East Africa Community (EAC).

In all cases, therefore, it is likely to take considerable time before any of the harmonized plans is widely observed. Any country could have already taken unilateral action to accept the variety lists and certification marks of other countries without having to wait for the full set of regional negotiations to be concluded. So far, however, only Kenya, Tanzania, and Uganda have adopted any type mutual recognition by agreeing to require just one season of domestic field trials if a variety has been approved in one of the other two countries.

There is also a significant risk that administrative requirements not specifically addressed by the seed agreements might still be used to limit trade. Consignment specific import and export permits unrelated to phytosanitary matters are widely used in Africa to control the trade of food staples and

[8] In Africa, only Botswana, Equatorial Guinea, Mauritania, Mozambique, Somalia, South Sudan, and South Africa are not party to the IT-PGRFA. All other countries are contracted to the Treaty except for Nigeria, which is a signatory only (see: http://www.planttreaty.org).

other agriculture commodities. These policies are often enacted in the name of protecting domestic food security, protecting local producer prices, keeping consumer prices low, and other assorted political objectives. In Zambia, for example, seed companies complain that it is difficult to obtain import permits for seed unless they demonstrate good case-by-case reasons for not producing the variety in Zambia. Likewise, in other countries, private companies have said they cannot get export permits because the country is deficit in seed. Together with variety release procedures and seed certification standards that are difficult to implement, administrative requirements can still be a significant deterrent to investment. Unless seed companies are certain of being able to export and import their products whenever and wherever they want according to market demands, there almost may as well not be a free trade system at all.

Agriculture growth depends on far more than seed. This point may be obvious enough, but is worth emphasizing that agriculture growth depends on far more than seed trade. Crop production begins with the seeds farmers use, but real change to the point where Africa is able to feed itself and even become a food exporter depends on growers having affordable access to fertilizer and other inputs together with secure access to domestic and international markets for the food they produce.

To improve access to inputs, many African countries have turned to fertilizer and seed subsidies to help poor farmers overcome the problem of high costs. To the extent that regional free trade speeds access to higher yielding varieties and saves on other transaction costs that help bring prices down, adoption of harmonized trade rules could have a significant positive impact on the returns from investing in farmer subsidies. At the same time, however, subsidy programs are inherently prone to leakage of expensive inputs across borders and are often beset with problems of late delivery to the point where other types of seed than F1 hybrids would be a better choice for household food security and commercial production. Improving regional trade conditions for seed is therefore an important step to increasing Africa's agriculture competitiveness, but is far from sufficient for rapid agriculture growth and may have little effect at all if farmers still cannot afford improved varieties and other inputs needed to make the seeds work.

Conclusions

Taken together the discussion shows that harmonized seed trade offers many potential benefits to Africa, but is likely a long way from becoming a reality. Probably the most important advantage of the harmonized seed systems is the potential for savings of time and cost to register new varieties. Systems designed to speed border procedures by adopting common certification standards and universal pest lists can also help attract new private investment and enable public sector researchers to focus on important food crops that are currently being neglected.

Compared with other approaches to trade facilitation, however, the analysis also shows that regional harmonization is a complex solution with a seemingly endless number of details to work out. After many years of dialogue, and with Africa lagging far behind the rest of the world in per hectare yields and productivity gains, many operational rules still need to be finalized, national laws have to be amended, and new implementation capacitates have to be developed. The challenges

of harmonization are particularly evident in Africa where countries are at very different stages of development and often have limited capabilities to implement or even afford systems developed for advanced market economies. In the coming months and years, there are likely to be many calls for donors to support the construction and upgrading of laboratory facilities to ISTA standards and other capacity building activities needed to implement the new systems when other more direct approaches to improved seed trade have been available all along.

Fortunately, the analysis also points to a number of practical areas where action could be taken in the near term to improve farmer access to quality seed. Rather than wait for the full set of regional trade rules to become operational, for example, steps like those taken by Kenya, Tanzania, and Uganda to streamline variety release procedures based on mutual recognition of test results would be a significant move in the right direction. These three countries have the benefit of being united through the EAC and ASARECA, but any country in Africa could decide to accept other variety lists with or without a limited number of domestic field trials whenever it wants. Most African countries have already expressed their firm commitment to regional free trade and variety acceptance, so if a seed has been shown to be a good performer in another country with similar growing conditions there is little or no reason to prevent market entry.

Direct action could also be taken to simplify national variety trials. In scientific terms, only a limited amount of DUS and VCU information is required to distinguish a new variety and to ensure it is a good performer. DUS trials in particular are not affected much by the environment and could be streamlined to look at a handful of criteria in one season only (Setimela et al., 2009). As discussed, however, many national seed authorities collect data for dozens of traits in multiple locations over many seasons thereby stretching limited capacities and imposing high costs on public and private seed companies alike. To the extent that exact scientific criteria are rarely specified in actual seed laws, many of these test procedures could be simplified by the seed agencies themselves without amending national legislation. Greater willingness to accept data supplied by public and private plant breeders who know their seeds best could also help avoid bottlenecks and speed variety introduction.

Many countries could also take immediate steps to make national variety release criteria more transparent. As discussed, several countries in Africa have not published appraisal criteria for DUS and VCU trials meaning that plant breeders do not know what traits matter or how the test data will be interpreted. Not only can this lead to problems with favoritism and even corruption, but the lack of known criteria also means that variety release committees may reject a seed and ask plant breeders to improve on traits that could have been addressed years earlier in the breeding process.

Another practical strategy to speed farmer access to new varieties would be to allow seed companies to embark on the production of pre-basic, breeder, and even certified seed while release trials are ongoing. Currently, most countries only permit seed multiplication and bulking after a variety is registered thereby imposing a two to three year delay before the variety is available to farmers. Wider use of FAO's QDS System could also help to avoid bottlenecks during seed certification and would be a practical way to improve on the current situation in which many

farmers have no choice but to rely on non-certified and/or potentially counterfeit seed sold in open markets.

As individual countries and regions move to adopt new trade policies, efforts to monitor progress and measure whether changes in seed rules really make a difference to sector performance will also be important. Some of the most obvious variables to track include the number of varieties available in each country, number of new varieties released per year, seed prices, and changes in crop yields. At the producer level, specific efforts to monitor the impact on poor farmers including what types of seed these growers use, where they get their seeds, and whether or not they are able to access the seeds they truly desire would also be highly relevant to tracking the effects of policy reform. New data systems including crowdsourcing using very simple SMS-based questionnaires might be one way to gather this information.

Ultimately, no matter what rules or systems that individual countries or regional economic communities adopt the basic objective of increasing farmer access to quality seed must be kept in mind. Each day that goes by without real improvement, Africa becomes more and more dependent on food imports from the rest of the world. Of course, many types of policy reform and investment are needed for agriculture transformation, but at least in the area of seed there is considerable evidence from other developing countries to show that relaxing controls on variety introduction can make a significant difference to crop yields and rural incomes in just a few years. Without having to rely on advanced systems or complex trade rules, the analysis also shows there are many simple options for improved seed trade that countries could implement directly while dialogue on full regional harmonization continues.

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Appendix 1: List of countries by regional group

Eastern and Southern Africa

	ASARECA	COMESA	SADC
Angola			X
Botswana			X
Burundi	X	X	
Comoros		X	
Congo DR	X	X	X
Djibouti		X	
Egypt*		X	
Eritrea	X	X	
Ethiopia	X	X	
Kenya*	X	X	
Lesotho			X
Libya		X	
Madagascar	X	X	X
Malawi*		X	X
Mauritius		X	X
Mozambique			X
Namibia			X
Rwanda	X	X	
Seychelles		X	X
South Africa*			X
Swaziland		X	X
Sudan	X	X	
S. Sudan	X		
Tanzania	X		X
Uganda	X	X	
Zambia*		X	X
Zimbabwe*		X	X
Total members	**11**	**19**	**15**

Western Africa

	ECOWAS	UEMOA
Benin	X	X
Burkina Faso	X	X
Cape Verde	X	
Chad	E*	
Cote d'Ivoire	X	X
Gambia	X	
Ghana	X	
Guinea	X	
Guinea Bissau	X	X
Liberia	X	
Mali	X	X
Mauritania	E*	
Niger	X	X
Nigeria	X	
Senegal	X	X
Sierra Leone	X	
Togo	X	X
Total members	**15**	**8**

E = Mauritania and Chad have also endorsed the ECOWAS seed agreement.

* County currently has an ISTA accredited laboratories for seed sampling.

Appendix 2: List of crops covered by the harmonized seed plans

In COMESA, SADC, and ECOWAS/UEOMA, the seed systems including procedures for variety release and certification are limited to specific crops. For ASARECA, the crops indicated are ones for which some countries have developed shared certification standards. The ECOWAS and UEMOA seed agreements are identical.

	ASARECA	COMESA	SADC	ECOWAS/ UEOMA
Field Crops				
Beans	X	X	X	
Cassava	X	X		X
Cotton (OPV)		X	X	
Cotton (hybrid)			X	
Cowpea			X	X
Groundnuts	X	X	X	X
Irish potato	X	X		X
Maize (OPV)	X*	X	X	X*
Maize (hybrid)	X*	X	X	X*
Pearl millet		X	X	X
Pigeon pea			X	
Rice (OPV)	X*	X	X*	X*
Rice (hybrid)	X*	X	X*	X*
Sorghum (OPV)	X*	X	X	X*
Sorghum (hybrid)	X*	X	X	X*
Sunflower (OPV)	X*	X	X	
Sunflower (OPV)	X*	X	X	
Soybeans	X	X	X	
Tobacco			X	
Wheat	X	X	X	
Yam				X
Vegetables				
Onion				X
Tomato				X
TOTAL CROPS	**10 (14*)**	**16**	**17 (18*)**	**11 (14*)**

* Hybrid or OPV not specified and/or no distinction in draft certification requirements.